



**IN THE UNITED STATES PATENT & TRADEMARK OFFICE**

**AMENDMENT AFTER FINAL REJECTION**  
**EXPEDITED EXAMINING PROCEDURES**

In re Patent Application of:

Michael Colin BEGG

Atty. Ref.: LSN-34-125

Serial No.: 10/812,917

T.C./A.U.: 3729 – Conf. No.: 5698

Filed: March 31, 2004

Examiner: Anthony Dexter Tugbang

For: MANUFACTURE OF SHIM WINDINGS

**MAIL STOP AF**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

**FACTUAL DECLARATION OF**

**FREDERICK THOMAS DAVID GOLDIE**

**PURSUANT TO 37 C.F.R. §1.132**

I, Frederick Thomas David Goldie hereby state and declare of my own personal knowledge and/or belief as follows:

1. THAT I am currently Research Scientist at Tesla Engineering Ltd.
2. THAT I have formal education including: M.A.(Cantab) (Natural Sciences [Physics]), Ph.D. (Cantab) (Low Temperature Physics)

Michael Colin BEGG  
Serial No. 10/812,917

3. THAT my past employment duties have included posts as an MRI physicist with Picker International Ltd., (1984-1989), Surrey Medical Imaging Systems (1989-1994), Magnex Scientific Ltd.,(1994-1999), and Tesla Engineering Ltd. (1999-Present)

4. THAT I am familiar with the above-identified US patent application and the office action dated March 10, 2009 rejecting all claims as allegedly having been made obvious by the applicant's admitted prior art ("AAPA") in view of the Takahashi '744 patent. I respectfully disagree.

5. THAT the background section of the specification admits that it is well known and conventional to make shim coils. MRIS systems have been around for over 25 years and they have typically employed shim coils of various designs – but not by use of methodology now claimed as invention by the applicant. The AAPA described at pages 1-3 of the specification includes the fact that a number of less advantageous methods were known in the prior art for fabricating shim coils – including the use of photo-etching and of winding using insulated conductors. The AAPA thus does teach how at least some prior MRIS shim coils were manufactured, namely, photo-etching and the formation of windings using insulated conductors.

6. THAT, inter alia, the claims of this application recite a method for making an electrical MRIS shim coil in which an initial punching step leaves bridging portions between adjacent cut lengths of conductor within the coil windings. Further, these

Michael Colin BEGG  
Serial No. 10/812,917

bridges are maintained in place while the windings are attached to an insulating substrate – and only after attachment to the substrate are the bridges removed.

7. THAT the inclusion of such method steps allows the production of large-scale, accurately produced windings of the type required for MRIS shim coils. At the same time, it yields a cost-effective and efficient manufacturing process.

8. THAT the Takahashi '744 patent describes a process for forming a gradient coil using a stamping process. This process is a one-step process using a die and, moreover, it relates to the production of gradient coils rather than shim coils. Gradient coils are typically designed to carry several hundred amperes in a pulsatile fashion, and to withstand voltages of 1kV or more. Conductor tracks are 5-20mm wide, and 1-3mm thick. Shim coils, on the other hand, operate at a few amperes, and a few volts, in a DC mode. I myself initially opposed the idea of punched shim windings, citing long punching paths, and lower current density, due to material lost through punching.

9. THAT the Takahashi '744 patent does not describe or suggest the use of bridging portions to help accurately manufacture the resulting coil. As a result of not including bridge in the Takahashi coils, there will be increased handling difficulties in transferring the punched coil to the insulating substrate and an increased likelihood of the coils being displaced relative to one another which can have an adverse effect on the field pattern generated.

Michael Colin BEGG  
Serial No. 10/812,917

10. THAT the novel process described and claimed in the subject application recognizes that by punching out coil patterns, but leaving in place small bridges of material between the adjacent turns of the coil, the benefits associated with coil punching or stamping could still be achieved while reducing or minimizing problems which might arise by the inaccurate placement of the turns on an insulating substrate and the issues which arise in handling the punched coils.

11. THAT neither the cited Hoppe '198 patent nor the cited LaPlante '481 patent relates to the manufacture of MRIS shim coils.

12. THAT the Hoppe '198 patent, in particular, is related to a very different field for making tiny coils for use in card-like data carriers. The problems and considerations associated with producing large-scale MRIS shim coils are completely different from those for creating extremely small coils for use in data carrying cards and the like. In particular, Hoppe's coils appear to be a few millimeters in size. Thus, while Hoppe does relate to the formation of coils using a punching process, in general terms, the skilled person would pay little attention to that document when considering the manufacture of MRIS shim coils.

13. THAT the LaPlante '481 patent, on the other hand, does not refer to punching coils whatsoever. *A fortiori*, LaPlante does not describe or suggest a coil-making process including a first punching step where bridges of material are left along the cutting paths. LaPlante, instead, relates to a system of forming coils where, first of

Michael Colin BEGG  
Serial No. 10/812,917

all, copper layers are bonded to a ceramic substrate and, after this, laser cutting is used to form a coil structure by machining away the copper sheets to leave the turns of the coil. This fundamental nature of the coils of LaPlante is made clear, for example, in the passage of LaPlante starting at 2:15.

14. THAT, further, even if one considers, *arguendo*, that the copper sheets 101, 103 shown, for example, in Fig. 1 are punched components, then it is not true to say that a coil pattern is produced by punching, nor can it properly be said that there are plural bridging portions between lengths of conductive material in the cut pattern. In LaPlante, there is simply a complete sheet of copper (having no coil patterns in it whatsoever) which is bonded to a substrate, and only after this are the coil patterns produced – and these are produced by laser machining, not punching. Thus, LaPlante does not disclose forming a coil by punching – nor does it disclose the idea of providing temporary bridges between adjacent paths of a punched coil.

15. THAT it is further noted that Hoppe also fails to disclose the provision of bridge portions ***between adjacent lengths*** of conductive material in the cut pattern of a ***coil*** and thus fails to disclose removal of any such bridges ***within a coil pattern*** – after mounting of the coil pattern on an insulating substrate.

16. THAT even if it be assumed, *arguendo*, that some instance of prior art discloses removing bridging portions before attachment of a punched pattern to a substrate, it is pointed out that such a teaching, even if it exists, is irrelevant and

Michael Colin BEGG  
Serial No. 10/812,917

useless for arriving at the applicant's claimed invention. It is only when the bridging portions are retained in place until after the punched structure is mounted on a supporting insulating substrate that there is any benefit in their provision at all as contemplated by the applicant's claimed invention.

17. THAT it is incorrect to assert that there are various advantages associated with the coil-making process disclosed in LaPlante and, therefore, this could be used to modify, for example, the process disclosed in Takahashi. The coil-making process disclosed in LaPlante is completely different from, for example, Takahashi, where the idea of punching coils is mentioned. LaPlante does not relate to a punching technique – nor is it compatible with a punching technique. To begin to use the idea of LaPlante, one would have to completely dismiss and stop using the ideas of Takahashi.

18. THAT the present applicant has determined and realized that the performance of shim coils and efficiency of their manufacturing may be improved by, first of all, using a punching process and then using the defined step of retaining bridges between the windings of the punched coil pattern until such time as the punched coil pattern is mounted to an insulating substrate.

Michael Colin BEGG  
Serial No. 10/812,917

19. THAT I have been warned and understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

3rd Aug 2009  
Date

Frederick Thomas David Goldie  
Frederick Thomas David Goldie